

Montana Fish, Wildlife & Parks

SPECIFICATIONS FOR WORK SPECIAL PROVISIONS

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1. PROJECT DESCRIPTION

The Project involves construction work associated with:

Intake Fishing Access Site (FAS) 2018 Water System Re-bid

Project # 7153728

Located near Intake, Dawson County, MT

The project generally includes , but is not specifically limited to: removal or killing of the existing artesian well, replacing it with a new artesian well, removal of the existing well house and replacing it with a new well house northeasterly, installing of approximately 30 lineal feet new water system two(2) inch polyvinyl chloride main along with valves and other water works appurtenances.

PROJECT RELATED CONTACTS

Project contacts are designated as follows:

Owner:

Montana FWP
1420 E. Sixth Ave.
PO Box 200701
Helena, MT 59620-0701

FWP Project Representative:

Thomas M. Mannatt
FWP Project Manager
1522 9th Avenue
Helena, MT 59620
406-841-4006 (wk)
406-431-4031 (cell)
406-841-4004 (fax)

2. SITE INSPECTION

All Bidders should satisfy themselves as to the construction conditions by personal examination of the site described in this document. Bidders are encouraged to make any - investigations necessary to assess the nature of the construction and the difficulties to be encountered, see General Conditions, Article 3.

3. SOILS INFORMATION

Geotechnical investigation work has not been done for this Project. It is the responsibility of the Bidders to conduct all investigations and determine the soil type and digging conditions that may be encountered with this Project prior to bid preparation, see General Conditions, Article 3.

4. PROJECT REPRESENTATIVE, INSPECTIONS, AND TESTING

The Contractor's work will be periodically tested and observed to insure compliance with the Contract Documents. Complete payment will not be made until the Contractor has demonstrated that the work is complete and has been performed as required. If the Project Representative detects a discrepancy between the work and the requirements of the Contract Documents at any time, up to and including final inspection, such work will not be completely paid for until the Contractor has corrected the deficiency, see General Conditions, Article 9.

The Project Representative will periodically monitor the construction of work to determine if the work is being performed in accordance with the contract requirements. The Project Representative does not have the authority or means to control the Contractor's methods of construction. It is, therefore, the Contractor's responsibility to utilize all methods, equipment, personnel, and other means necessary to assure that the work is installed in compliance with the Drawings and Specifications, and laws and regulations applicable to the work. Any discrepancies noted shall be brought to the Contractor's attention, who shall immediately correct the discrepancy. Failure of the Project Representative to detect a discrepancy will not relieve the Contractor of his ultimate responsibility to perform the work as required, see General Conditions, Article 3.

The Contractor shall inspect the work as it is being performed. Any deviation from the Contract requirements shall be immediately corrected. Prior to any scheduled observation by the Project Representative, the Contractor shall again inspect the work and certify to the Project Representative that he has inspected the work and it meets the requirements of the Contract Documents. The Project Representative may require uncovering of work to verify the work was installed according to the contract documents, see General Conditions, Article 12.

The work will be subject to review by the Project Representative. The results of all such observations, and all contract administration, shall be directed to the Contractor only through the Project Representative.

5.1 Services Required by the Contractor. The Contractor shall provide the following services:

- a. Any field surveys to establish locations, elevations, and alignments as stipulated on the Contract Documents. FWP reserves the right to set preliminary construction staking for the project. The Contractor is responsible to notify FWP for any construction staking discrepancies.
- b. Preparation and certification of all required shop drawings and submittals as described in the General Conditions, Article 3.
- c. All testing requiring the services of a laboratory to determine compliance with the Contract Documents shall be performed by an independent commercial testing

laboratory acceptable to the Project Representative. The laboratory shall be staffed with experienced technicians properly equipped, and fully qualified to perform the tests in accordance with the specified standards.

- d. Preparation and submittal of a construction schedule, including submittals, see General Conditions, Article 3. The schedule shall be updated as required, as defined in the Contract Documents.
- e. All Quality Control testing as required by the Contractor's internal policies.
- f. All Quality Assurance testing and/or re-testing as stated in the Contract Documents, see General Conditions, Article 13.

5.2 Services Provided by the Owner. The Owner shall provide the following services at no cost to the Contractor except as required for retests as defined in the Contract Documents.

- a. The Project Representative may check compaction of backfill and surfacing courses using laboratory testing submittal information supplied by the Contractor. These tests are to determine if compaction requirements are being fulfilled in accordance with the Contract Documents. It is ultimately the responsibility of the Contractor to ensure that this level of compaction is constant and met in all locations.
- b. Any additional Quality Assurance testing deemed appropriate by the Owner, at the Owner's expense.

5. ENGINEERING INTERPRETATIONS

Timely Engineering decisions on construction activities or results have an important bearing on the Contractor's schedule. When engineering interpretation affects a plan design or specifications change, it should be realized that more than 24 hours may be required to gain the necessary Owner participation in the decision process including time for formal work directive or change order preparation as required.

6. REJECTED WORK

Any defective work or nonconforming materials or equipment that may be discovered at any time prior to the expiration of the warranty period, shall be removed and replaced with work or materials conforming to the provisions of the Contract Documents, see General Conditions, Article 12. Failure on the part of the Project Representative to condemn or reject bad or inferior work, or to note nonconforming materials or equipment on the Contractors submittals, shall not be construed to imply acceptance of such work. The Owner shall reserve and retain all its rights and remedies at law against the Contractor and its Surety for correction of any and all latent defects discovered after the guarantee period (MCA 27-2-208).

Only the Project Representative will have the authority to reject work which does not

conform to the Contract Documents.

7. UTILITIES

The exact locations of existing utilities that may conflict with the work are not precisely known. It shall be the Contractor's responsibility to contact the owners of the respective utilities and arrange for field location services. **One Call Locators, 1-800-424-5555**

The Contract Documents may show utility locations based on limited field observation and information provided to the Project Representative by others. **The Project Representative cannot guarantee their accuracy.** The Contractor shall immediately notify the Project Representative of any discrepancies with utility locations as shown on the Contract Drawings and/or their bury depths that may in any way affect the intent of construction as scoped in these specifications.

There will be no separate payment for exploratory excavation required to locate underground utilities.

8.1 Notification. The Contractor shall contact, in writing, all public and private utility companies that may have utilities encountered during excavation. The notification includes the following information:

- a. The nature of the work that the Contractor will be performing.
- b. The time, date and location that the Contractor will be performing work that may conflict with the utility.
- c. The nature of work that the utility will be required to perform such as moving a power pole, supporting a pole or underground cable, etc.
- d. Requests for field location and identification of utilities.

A copy of the letter of notification shall be provided to the Project Representative. During the course of construction, the Contractor shall keep the utility companies notified of any change in schedule, or nature of work that differs from the original notification.

8.2 Identification. All utilities that may conflict with the work shall be the Contractor's responsibility to locate before any excavation is performed. Field markings provided by the utility companies shall be preserved by the Contractor until actual excavation commences. All utility locations on the Drawings should be considered approximate and should be verified in the field by the Contractor. The Contractor shall also be responsible for locating all utilities that are not located on the Drawings.

Utilities are depicted on the Contract Documents in accordance with their achieved "Quality Levels," as defined in the American Society of Civil Engineer's Document, ASCE 38, "Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data." Reliance upon these data for

risk management purposes during bidding does not relieve the Contractor, or Utility Owner from following all applicable utility damage prevention statutes, policies, and/or procedures during construction. It is important that the Contractor investigates and understands the scope of work between the project Owner and Engineer regarding scope of limits of the utility investigations leading to these utility depictions. Definitions of Quality Levels are described as follows:

- a. "QUALITY LEVEL A" – (QLA): LOCATING THROUGH EXCAVATION. QLA data are highly accurate and are obtained by surveying an exposed utility. As such, both horizontal and vertical data are recorded. Survey accuracies are typically set at 15mm (1/2-inch) vertically, and to project survey standards horizontally (typically the same as for topography features), although these survey accuracies and precisions are generally left to the owner to specify in a scope of work. In addition to the applicable standard of care and any other additional standards imposed by commercial indemnity clauses, the accuracy of these location data is also typically guaranteed. Other data typically characterized include material type, surface elevation, utility size/capacity, outside dimensions, and configurations, soil type, and utility condition.
- b. "QUALITY LEVEL B" – (QLB): DESIGNATING. QLB information is obtained through the application of appropriate surface geophysical methods to identify the existence and approximate horizontal location of utilities (a utility's "designation") within the project limits, followed by survey, mapping, and professional review of that designation. Underground utilities are identified by interpretation of received signals generated either actively or passively, and through correlating these received signals with visible objects (QLC) and record data (QLD) to determine function. Designated utilities that can't be identified are labeled as "unknowns." Although approximate has no accuracy associated with it, generally the locations are within inches rather than feet. The more utility congested the area or the deeper the utilities, the less likely it is that the designations will achieve that accuracy. These designations are then surveyed to project accuracies and precisions, typically third-order accuracy similar to other topography features. Note that surveying existing one-call marks does not lead to QLB data, since the genesis of the marks was not under the direct responsible charge of the professional certifying the QLB depictions, and one-call generally does not address unknown utilities, privately owned utilities, utilities without records, abandoned utilities, and so on. Nor does the professional have knowledge of the field technician's qualifications, training, and level of effort.

- c. "QUALITY LEVEL C" – (QLC): SURFACE VISIBLE FEATURE SURVEY. QLC builds upon the QLD information by adding an independent detailed topography site survey for surface-visible appurtenances of subsurface utilities including but not limited to fire hydrants, valves, risers, and manholes. Professional judgment is used to correlate the QLD data to the surveyed features, thus increasing the reliability of both utility location and existence. It is a function of the professional to determine when records and features do not agree and resolve discrepancies. This may be accomplished by depiction of a utility line at quality level D, effectively bypassing or disregarding (but still depicting) a surveyed structure of unknown origin. Additional resolution may result from consultation with utility owners.
- d. "QUALITY LEVEL D" – (QLD): EXISTING RECORDS RESEARCH. QLD is the most basic level of information. Information is obtained from the review and documentation of existing utility records, verbal accounts, and/or one-call markings (to determine the existence of major active utilities and their approximate locations).

- 8.3 Removal or Relocation of Utilities. All electric power, street lighting, gas, telephone, and television utilities that require relocation will be the responsibility of the utility owner. A request for extending the specified contract time will be considered if utility owners cause delays.
- 8.4 Public Utilities. Water, sewer, storm drainage, and other utilities owned and operated by the public entities shall, unless otherwise specifically requested by the utility owner, be removed, relocated, supported or adjusted as required by the Contractor at the Contractor's expense. All such work shall be in accordance with these Contract Documents, or the Owner's Standard Specifications or written instructions when the work involved is not covered by these Specifications.
- 8.5 Other Utilities. Utilities owned and operated by private individuals, railroads, school districts, associations, or other entities not covered in these Special Provisions shall, unless otherwise specifically requested by the utility owner, be removed, relocated, supported or adjusted as required by the Contractor at the Contractor's expense. All work shall be in accordance with the utility owner's directions, or by methods recognized as being the standard of the industry when directions are not given by the owner of the utility.
- 8.6 Damage to Utilities and Private Property. The Contractor shall protect all utilities and private property and shall be solely responsible for any damage resulting from his construction activities. The Contractor shall hold the Owner and Project Representative harmless from all actions resulting from his failure to properly protect utilities and private property. All damage to utilities

shall be repaired at the Contractor's expense to the full satisfaction of the owner of the damaged utility or property. The Contractor shall provide the Owner with a letter from the owner of the damaged utility or property stating that it has been repaired to the utility owner's full satisfaction.

- 8.7 Structures. The Contractor shall exercise every precaution to prevent damage to existing buildings or structures in the vicinity of his work. In the event of such damages, he shall repair them to the satisfaction of the owner of the damaged structure at no cost to the Owner.
- 8.8 Overhead Utilities. The Contractor shall use extreme caution to avoid a conflict, contact, or damage to overhead utilities, such as power lines, streetlights, telephone lines, television lines, poles, or other appurtenances during the course of construction of this project.
- 8.9 Buried Gas Lines. The Contractor shall provide some means of overhead support for buried gas lines exposed during trenching to prevent rupture in case of trench caving.
- 8.10 Pavement Removal. Where trench excavation or structure excavation requires the removal of curb and gutter, concrete sidewalks, or asphalt or concrete pavement, the pavement or concrete shall be cut in a straight line parallel to the edge of the excavation by use of a spade-bitted air hammer, concrete saw, colter wheel, or similar approved equipment to obtain a straight, square clean break. Pavement cuts shall be 2 feet wider than the actual trench opening.
- 8.11 Survey Markers and Monuments. The Contractor shall use every care and precaution to protect and not disturb any survey marker or monuments, such as those that might be located at lot or block corners, property pins, intersection of street monuments or addition line demarcation. Such protection includes markings with flagged high lath and close supervision. No monuments shall be disturbed without prior approval of the Project Representative. Any survey marker or monument disturbed by the Contractor during the construction of the project shall be replaced at no cost to the Owner by a licensed land surveyor.
- 8.12 Temporary Utilities. The Contractor shall provide all temporary electrical, lighting, telephone, heating, cooling, ventilating, water, sanitary, fire protection, and other utilities and services necessary for the performance of the work. All fees, charges, and other costs associated therewith shall be paid for by the Contractor.

8. CONSTRUCTION SAFETY

The Contractor shall be solely and completely responsible for conditions of the jobsite, including safety of all persons (including employees and subcontractors) and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to U.S. Department of Labor (OSHA), and all other applicable federal, state, county, and local laws, ordinances, codes, and regulations. Where any of these are in conflict, the more stringent requirement shall be followed. The Contractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve them from compliance with the obligations and penalties set forth therein, see General Conditions, Article 10.

9. CONSTRUCTION LIMITS AND AREAS OF DISTURBANCE

- 10.1 Construction Limits. Where construction easements or property lines, are not specifically called out on the Contract Documents, limit the construction disturbance to ten (10) feet, when measured from the edge of the slope stake grading, or to the adjacent property line, whichever is less. Disturbance and equipment access beyond this limit is not allowed without the written approval of both the Project Representative and the Owner of the affected property. If so approved, disturbance beyond construction limits shall meet all requirements imposed by the landowner; this includes existing roads used and/or improved as well as the construction of new access roads. Special construction, reclamation, or post-construction reclamation or other closure provisions required by the landowner on access roads beyond the construction limits shall be performed by the Contractor at no additional cost to the Owner.
- 10.2 Areas of Disturbances. Approved areas of disturbance are those areas disturbed by construction activities within the construction limits and along designated or approved access routes. Such areas may require reclamation and revegetation operations, including grading to the original contours, top soiling with salvaged or imported topsoil, seeding, fertilizing, and mulching as specified herein. Other areas that are disturbed by the Contractor's activities outside of the limits noted above will be considered as site damage or unapproved areas of disturbance, see General Conditions, Articles 3 and 10. This includes areas selected by the Contractor outside the defined construction limits for mobilization, offices, equipment, or material storage.

10. DECONTAMINATE CONSTRUCTION EQUIPMENT

Power wash all construction equipment entering the project site to prevent the spread of noxious weeds and aquatic invasive species. This applies to all FWP projects, whether or not individual construction permits specifically address cleaning of equipment.

11. TREE PROTECTION AND PRESERVATION

The Contractor and the Owner shall individually inspect all trees within the project construction limits prior to construction. The Owner shall determine which trees are to be removed and which trees are to be preserved. Construction of the grading, utilities and various roadway facilities must not significantly damage the trees root system or hinder it's chances for survival. Reasonable variations from the Contract Documents, as directed by the Project Representative, may be employed to ensure the survival of trees.

12. CONSTRUCTION SURVEYS

The Contractor will be responsible for all layout and construction staking utilizing the Project Representative's existing control and coordinate data for the project. Dimensions and elevations indicated in layout of work shall be verified by the Contractor. Discrepancies between Drawings, Specifications, and existing conditions shall be referred to the Project Representative for adjustment before work is performed. The Project Representative may set location and grade stakes prior to construction; however, it is ultimately the responsibility of the Contractor to check and verify all construction staking for the project.

Existing survey control (horizontal and vertical) has been set for use in the design and ultimately the construction of these improvements. A listing of the coordinates and vertical elevation for each of these control points may be included in the project drawings.

The Contractor will be responsible for preserving and protecting the survey control until proper referencing by the Contractor has been completed. Any survey control obliterated, removed, or otherwise lost during construction will be replaced at the Contractor's expense.

Contractor shall be aware of property pins and survey monuments. Damage to these pins will require replacement of such by a registered land surveyor at no cost to the owner.

The Contractor shall provide construction staking from the Contractor's layouts and the control points. Contractor's construction staking includes at a minimum:

1. Slope stakes located at critical points as determined by the Project Representative.
2. Blue tops every longitudinally and transversely for subgrade and crushed base to verify finish grading of course.
3. Location and grade stakes for drainage features and retaining walls.
4. Location stakes for roadside safety items, permanent and temporary traffic control, and misc. items as determined by the Project Representative.

Original field notes, computations and other records take by the Contractor for the purpose of quantity and progress surveys shall be furnished promptly to the Project Representative and shall be used to the extent necessary in determining the proper amount of payment due to the Contractor.

13. MATERIAL SOURCES AND CONSTRUCTION WATER

The Contractor shall be responsible for locating all necessary material sources, including aggregates, earthen borrow and water necessary to complete the work. The Contractor shall be responsible for meeting all transportation and environmental regulations as well as paying any royalties. The Contractor shall provide the Project Representative with written approvals of landowners from whom materials are to be obtained, prior to approval.

The Contractor may use materials from any source, providing the materials have been tested through representative samples and will meet the Specifications.

Water for compaction efforts shall be supplied by the Contractor.

14. MATERIALS SALVAGE AND DISPOSAL

Notify the Owner for any material salvaged from the project site not identified in the Contract Documents. The Owner reserves the right to maintain salvaged material at the project site, compensate the Contractor for relocation of salvaged material, or agreed compensation to Owner for material salvaged by the Contractor.

Haul and waste all waste material to a legal site and obey all state, county, and local disposal restrictions and regulations.

15. STORED MATERIALS

Contractor shall use an approved storage area for materials. Materials and/or equipment purchased by the Contractor may be compensated on a monthly basis. For compensation, provide the Project Representative invoices for said materials, shop drawings and/or submittals for approval, and applicable insurance coverage, see General Conditions, Article 9.

16. STAGING AND STOCKPILING AREA

Contractor shall use staging and stockpiling sites for to facilitate the project as approved by the Owner. Contract Documents may show approved staging and stockpiling locations. Notify Owner within 24 hours for approval of staging and stockpiling sites not shown on the Contract Drawings.

17. SECURITY

The Contractor shall provide all security measures necessary to assure the protection of equipment, materials in storage, completed work, and the project in general.

18. CLEANUP

Cleanup for each item of work shall be fully completed and accepted before the item is considered final. If the Contractor fails to perform cleanup within a timely manner the Owner reserves the right to withhold final payment.

Review these Contract Documents for additional Final Cleanup specifications for specific measures, associated with Contractor responsibilities and final payment.

19. ACCESS DURING CONSTRUCTION

Provide access to all public and private roadways and approaches within the project throughout the construction period.

20. CONSTRUCTION TRAFFIC CONTROL

The Contractor is responsible for providing safe construction and work zones within the project limits by implementing the rules, regulations, and practices of the Manual on Uniform Traffic Control Devices, current edition.

21. SANITARY FACILITIES

Provide on-site toilet facilities for employees of Contractor and Sub-Contractors and maintain in a sanitary condition.

22. CONTRACT CLOSEOUT

The Contractor's Superintendent shall maintain at the project site, a "Record Set of Drawings" showing field changes, as-built elevations, unusual conditions encountered during construction, and such other data as required to provide the Owner with an accurate "as constructed" set of record drawings. The Contractor shall furnish the "Record Set" to the Project Representative following the Final Inspection of the Project.

The Contractor's final payment will not be processed until the "Record Set" of drawings are received and approved by the Project Representative.

23. MEASUREMENT AND PAYMENT

Review these Contract Documents for additional Measurement and Payment specifications for definitions. Quantities are listed on the Bid Proposal for Payment Items. Additional material quantities, volumes, and measurements may be shown on the Contract Document drawings and/or specifications.

Unit Price quantities and measurements shown on the Bid Proposal are for bidding and contract purpose only. Quantities and measurements supplied, completed for the project, and verified by the Project Representative shall determine payment. Each unit price will be deemed to include an amount considered by the Contractor to be adequate to cover Contractor's overhead and profit for each bid item.

The Owner or Contractor may make a Claim for an adjustment in Contract Unit Price if the quantity of any item of Unit Price Work performed by the Contractor differs materially and/or significantly (increase or decrease by 50%) from the estimated quantity indicated on the Bid Proposal.

Lump sum bid item quantities will not be measured. Payment for these lump sums bid proposal items will be paid in full amount listed on the Bid Proposal when accepted by the Project Representative, unless specified otherwise.

Montana Fish, Wildlife & Parks

SPECIFICATIONS FOR WORK TECHNICAL PROVISIONS

Incorporation of Montana Public Works Technical Specifications.

The Technical Specifications as found in Montana Public Works Standard Specifications (MPWSS), Sixth Edition, April 2010 and/or current Addendums or Revisions; are hereby incorporated by reference and made a part of this Contract:

Incorporation of Montana Fish, Wildlife & Parks Technical Specifications and Modifications to MPWSS Technical Specifications.

In addition to the MPWSS Technical Specifications are the following Montana Fish, Wildlife & Parks Technical Specifications (modifications to MPWSS Technical Specifications).

SECTION 01050 -	Field Engineering
SECTION 01450 -	Mobilization/Demobilization
SECTION 01750 -	Final Cleanup
SECTION 02230 -	Street Excavation, Backfill, and Compaction
SECTION 02516 -	Frost- Proof Hydrant.
SECTION 02525 -	Water Supply Wells
SECTION 02600 -	Water Distribution
SECTION 02661 -	Pitless Unit
SECTION 02910-	Revegetation

SECTION 01050

FIELD ENGINEERING

All applicable portions of this specification section in the MPWSS shall apply with the following additions, deletions and/or modifications.

PART 3 EXECUTION

1.1 CONSTRUCTION SURVEY

- A. Engineer will provide survey control (northing/easting), benchmarks (vertical datum), and grade stakes for all designed alignments and profiles, as shown on the project Plans. Engineer will provide one set of stakes prior to the construction of the various project elements. The contractor shall notify the Engineer 72 hours in advance that the site has been prepared and staking is needed to start construction.
- B. Contractor shall perform all additional surveying, staking, recording of data, and calculations as necessary to construct the project from the initial layout to final completion. Reset stakes as many times as necessary to construct the work.
- C. The Engineer will set stakes and key geometric points and described above in item A. The contractor shall set reference stakes, based the Engineer's stakes as necessary to construct the work.

PART 4 MEASUREMENT AND PAYMENT

Add the following:

- A. Construction Surveying is incidental to the work and no separate payment is made for this item.

END OF SECTION 01050

SECTION 01450

MOBILIZATION/DEMOBILIZATION

Added Section.

PART 1 GENERAL

1.1 DESCRIPTION

- A. This item shall consist of the preparatory work and operations necessary performed by the Contractor for the movement of personnel, equipment, supplies, and incidentals to and from the work site. The work includes those actions necessary for obtaining necessary permits required for mobilization; for the establishment of all offices and facilities necessary to work on the project; for premiums on contract bonds; for insurance for the contract; and for other work on the various items on the project site. Mobilization costs for subcontracted work shall be considered to be included.
- B. Contractor's cost for administration, bonding, insurance, and site documents shall be included in mobilization and shall not be paid as a separate item.
- C. All equipment moved to the project sites shall be in good mechanical condition and free of fuel, oil, lubrication, or other fuel leaks. The Contractor shall immediately remove any equipment potentially or actually discharging environmentally damaging fluids.
- D. All equipment moved to the project sites shall be thoroughly cleaned before it is brought to the sites to prevent the introduction of weed seeds. Equipment removed from the sites may not be returned to the sites again until it is thoroughly cleaned again.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. There will be no direct measurement of this item.

4.2 PAYMENT

- B. Partial payments for mobilization/demobilization will be made based on the lump sum bid price as follows:

- 25% of the amount bid for mobilization/demobilization when the Contractor has moved on-site and begun construction activities.
- 50% of the amount bid for mobilization/demobilization when 25% of the contract amount (exclusive mobilization/demobilization) has been completed.
- 75% of the amount bid for mobilization/demobilization when 50% of the contract amount (exclusive mobilization/demobilization) has been completed.
- 100% of the amount bid for mobilization/demobilization when 75% of the contract amount (exclusive mobilization/demobilization) has been completed.

END OF SECTION 01450

SECTION 01750

FINAL CLEANUP

Added Section.

PART 1 GENERAL

1.1 DESCRIPTION

- A. This work consists of final cleanup of the project site prior to final acceptance.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 CONTRACTOR RESPONSIBILITIES

The contractor shall be responsible for final clean up at the end of the project to a level satisfactory to the owner. All construction debris, no matter how small, shall be collected and removed from the site. All wheel ruts shall be filled in and be leveled to match the adjacent grade and material. Re-seeding or re-sodding, or other re-surfacing may be necessary to repair any construction related impacts or damage.

All survey markings set as control points and boundary corners shall not be disturbed. If the contractor encounters a control point or boundary corner and it is in the way of construction, it shall be brought to the attention of the FWP project representative so that it can be avoided or properly preserved. The Project surveyor shall identify control points, whenever possible, with a marking/point to be saved.

All final slopes shall be dressed manually to remove woody debris, accumulated trash and oversized material. Any new slope or topsoil surfaces shall be hand raked to provide a uniform appearance. The contractor shall dress all gravel, pavement and concrete edges to eliminate abrupt edges and provide a smooth transition. All construction related temporary sediment control devices shall be removed as soon as practical.

PART 4 MEASUREMENT AND PAYMENT

4.1 PAYMENT

Unless specifically noted otherwise, all final cleanup work shall be incidental to other work items in the contract and no separate payment shall be made.

END OF SECTION 01750

SECTION 02230

STREET EXCAVATION, BACKFILL AND COMPACTION

All applicable portions of this specification section in the MPWSS shall apply with the following additions, deletions and/or modifications.

PART 1 GENERAL

1.3 DENSITY CONTROL TESTING

A. FIELD DENSITY TESTING

Delete this section and add the following:

In-place field density tests for quality assurance are at Contractors expense meeting AASHTO T238 (ASTM D2922) and AASHTO T239 (ASTM D3017), Nuclear Densometer Methods. Quality assurance field density testing frequency is once per compacted lift, or as directed by Engineer.

Retesting of failing areas is at the expense of the Contractor.

B. LABORATORY MAXIMUM DENSITY and OPTIMUM MOISTURE

Delete this section and add the following:

Quality assurance tests will be made by the Contractors independent testing laboratory for each on-site natural soil or each source of off-site material, including borrow material, to determine the laboratory maximum density values and optimum compaction moisture content under AASHTO T99 or ASTM D698.

PART 3 EXECUTION

3.1 CLEARING AND GRUBBING

Add the following:

Obtain necessary burning permits if cleared and grubbed material is burned on site. All stumps within construction limits shall be grubbed under this contract.

During the clearing and grubbing portion of the work the contractor shall stock pile sufficient desirable topsoil material for constructing the proposed landscape mounds as shown on the Plans.

3.4 EXCAVATION

Add the following:

Sheeting, Shoring, and Bracing: Except where trench banks are cut back on a stable slope, provide and maintain all sheeting, shoring, and bracing necessary to protect workers, and to protect adjoining grades and structures from caving, sliding, erosion or other damage in accordance with Occupational Safety and Health Standards (29 CFR Part 1926 – Construction Standards for Excavations), the Site Specific Health and Safety Plan, and other applicable codes and governing authorities.

PART 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT AND PAYMENT

Delete this section and add the following:

A. CLEARING AND GRUBBING

1. Clearing and grubbing will not be measured for payment and is considered incidental to other work items in this Contract.

B. EXCAVATION AND EMBANKMENT

1. Excavation and embankment will not be measured for payment and is considered incidental to other work items in this Contract

END OF SECTION 02230

SECTION 02525

WATER SUPPLY WELLS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Wells must be constructed by a licensed water well contractor in accordance with Title 37, Chapter 43, MCA and Title 36, Chapter 21, ARM, current edition, (Water Well Contractor rules) and as supplemented by these specifications.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Drilling public water supply wells.
 - 2. Sampling of formations
 - 3. Well logs and permitting
 - 4. Well development
 - 5. Yield and Pressure testing
 - 6. Well screens
 - 7. Well cleaning, disinfection and testing
 - 8. Well piping and fittings

1.3 DEFINITIONS

- A. PVC: Polyvinyl chloride plastic.

1.4 REFERENCES

- A. The publications listed below form a part of these Specifications to the extent referenced. The publications are referred to in the text by the abbreviated designation only.
- B. AMERICAN PETROLEUM INSTITUTE (API)
 - 1. API Spec.10 Specifications for Materials and testing Well Cement
- C. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
 - 1. ASTM A-53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
 - 2. ASTM A-120 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses
 - 3. ASTM A-134 Specification for Pipe, Steel, Electric-Fusion (ARC) - Welded (Sizes NPS 16 and Over)
 - 4. ASTM A-493 Specification for Stainless and Heat-Resisting Steel for Cold Heading and Cold Forging - Bar and Wire
 - 5. ASTM A-790 Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe
 - 6. ASTM C-33 Specification for Concrete Aggregate
 - 7. ASTM C-150 Specification for Portland Cement

- D. AMERICAN WELDING SOCIETY (AWS)
 - 1. AWS D1.1 Stainless Steel Welding
- E. AMERICAN WATER WORKS ASSOCIATION (AWWA)
 - 1. AWWA C-206 Standard for Field Welding of Steel Water Pipes
 - 2. AWWA A-100-84 Standard for Water Wells
- F. Water Well Contractor Rules (Current Edition) Title 37, Chapter 43, MCA and Title 36, Chapter 21, ARM

1.5 SUBMITTALS

- A. Manufacturers' data sheets on all materials used in constructing the wells, including but not limited to: permanent well casing, sanitary cover, piping and fittings, and packers.
- B. Drillers Water Well Contractor's License.
- C. Shop Drawings: Show layout and connections for well pumps.
 - 1. Project Record Documents: Record the following data for each water supply well:
 - a. Casings: Material, diameter, thickness, weight per foot of length, and depth below grade.
 - b. Screen: Material, construction, diameter, and opening size.
 - c. Pumping Test: Static water level, yield and drawdown information.
 - d. Log: Formation log indicating strata encountered.
 - e. Alignment: Certification that well is aligned and plumb within specified tolerances.
- D. Field quality-control reports, including the following:
 - 1. Substrata formations.
 - 2. Water-bearing formations.
 - 3. Water levels.

1.6 QUALITY ASSURANCE

- A. Well Driller Qualifications: An experienced water supply well driller licensed in the jurisdiction where Project is located.
- B. Comply with AWWA A100 for water supply wells.

1.7 PROJECT CONDITIONS

- A. Well Drilling Water: Contractor to provide temporary water for drilling purposes.
- B. Equipment: Depth of wells is expected to be range from 500 feet to approximately 600 feet below surface grade but may vary as determined by the Engineer. Drilling bits shall be sized for the hole diameter specified.
- C. Protection of Site: The Contractor shall protect all structures, roads, walkways, pipelines, trees, shrubbery, lawns, etc., during the progress of this work and shall remove all unused materials from the site. Upon completion of the work, the Contractor shall restore the

site as nearly as possible to its original condition. Water pumped or discharged from the well shall be conducted to a place where it will be possible to dispose of the water without damage to property or the creation of a nuisance. The Owner shall provide land and rights-of-way for water disposal facilities.

- D. Site Clearing: The Contractor shall be responsible for all clearing and grubbing necessary to prepare the site for drilling.

1.8 PERMITS, CERTIFICATES, LAWS AND ORDINANCES

- A. Contractor shall, at his own expense, procure all certificates and licenses required of him by law for the execution of this work.
- B. Drilling Contractor shall have a Water Well Contractor's license issued by the Montana Board of Water Well Contractors, as required by law.
- C. Contractor shall comply with all federal, state or local laws, ordinances or rules and regulations relating to the performance of the work.

1.9 PROTECTION OF QUALITY OF WATER

- A. The Contractor shall take such precautions as are necessary or as may be required permanently to prevent contaminated water or water having undesirable physical or chemical characteristics from entering, through the opening made by the Contractor in drilling the well, the stratum from which the well is to draw its supply.
- B. Contractor shall also take all necessary precautions during the construction period to prevent contaminated water, gasoline, etc. from entering the well either through the opening or by seepage through the ground surface.

1.10 WELL SECURITY

- A. At all times during the progress of the work, the Contractor shall protect the well to prevent either tampering with the well or the entrance of foreign matter into it.

PART 2 - PRODUCTS

2.1 DRILLING FLUIDS AND ADDITIVES

- A. All drilling fluids shall be approved for use by the National Sanitation Foundation (NSF) or a similar ANSI accredited laboratory organization.

2.2 PERMANENT STEEL CASING

- A. Permanent casing for all groundwater sources must be in accordance with ARM 36.21.647.
- B. All well casing shall be new, free from corrosion, clean, unperforated, and must extend to a minimum depth of 25 feet below grade.
- C. ASTM A-120 steel pipe with threaded ends and threaded couplings for threaded joints or welded joints according to AWWA C-206.

- D. Permanent well casing that is driven shall be equipped with a standard drive shoe at its lower end, welded or threaded onto the lower end of the string of casing. The shoe shall have a beveled cutting edge of metal forged, cast, or fabricated for this special purpose
- E. All casing joints shall be in accordance with ARM 36.21.642, be welded or screw coupled, and shall be watertight. If welded casing joints are used, the weld shall be a full penetrating weld at least equal in thickness to the wall thickness of the casing. Welded casing joints shall have a tensile strength equal to or greater than that of the casing.
- F. The well casing shall be of steel, be accordance with ARM 36.21.640 and shall be the nominal diameter as called out on the drawings and meet the following minimum requirements:

Nominal Size (inches)	Outside Diameter (inches)	Wall Thickness (inches)	Weight Per Foot (pounds)
2	2.375	.154	3.56
2	2.875	.203	5.79
3	3.500	.216	7.58
3	4.000	.226	9.11
4	4.500	.237	10.79
5	5.563	.244	13.70
6	6.625	.250	17.02
8	8.625	.250	22.36
10	10.75	.250	28.04
12	12.750	.312	41.45
14	14.000	.312	45.68
16	16.000	.312	52.27
18	18.000	.375	70.59
20	20.000	.375	78.60

- G. All casing having a diameter larger than 20 inches shall have a wall thickness of at least .375 inch.

2.3 INNER CASING

- A. Inner casing shall be of new steel and shall be the nominal diameter as called out on the drawings.
- B. Inner casing installed through caving formations, or for sealing out water of poor quality, and installed without driving, may be of lighter weight than specified by the table in Section 2.2 E.
 - 1. Minimum thickness: .188 inch
- C. If inner casing is driven, it must meet the requirements of Section 2.2.E.

2.4 TEMPORARY CASING

- A. Steel and capable of withstanding the structural load imposed during its installation and removal.

2.5 WATER WELL PERFORATIONS

- A. Perforating Casing: The Project Manager and the well driller will determine the extent of perforations required to achieve the required yield.

Perforations: Perforations shall be

1. 3/16"x6" slots: 4 slots per row
 2. Slots shall be staggered for strength
 3. No slots above 520 feet below surface grade
 4. Star bit or mill knife perforations may be made with prior permission of the Engineer.
 5. Install adequate perforations to limit inlet velocity to 0.1 fps
 6. If needed, the casing shall be perforated with a casing perforator.
- B. Screen Sizing (if proposed as a substitute for perforations) : The screen aperture and length shall be selected by the Engineer in consultation with the screen manufacturer, based on aquifer tests and lithology.

2.6 GROUT

- A. Bentonite Clay Grout: Mixture consisting of not less than one-half pound of commercial bentonite clay with one gallon of clear water.
- B. Neat Cement Grout: A mixture of not more than 6 gallons of clear water per 94-pound bag of Portland cement. Up to 5 percent, by weight, of bentonite clay may be used to improve flow and reduce shrinkage.
 1. No sand or gravel is to be used in cement grout.
 2. Cement: ASTM C 150, Type II.
 3. Aggregates: ASTM C 33, fine and coarse grades.
 4. Water: Potable.

2.7 CASING CENTRALIZERS

- A. Well casing to be sealed into an oversize drill hole should be equipped with centering guides to ensure the proper centering of a casing.
- B. Casings shall be centered in the sealed interval.
- C. Guides shall be of steel, at least 1/4 inch in thickness, evenly spaced in groups of 3 or 4 in 20 foot intervals or less.
- D. The casing must be provided with centralizers in accordance with ARM 36.21.649.

2.8 TEMPORARY CAP

- A. Steel or cast iron of at least ¾-inch in thickness
- B. Watertight seal
- C. Hinged and suitable for locking.

2.9 WELL CAP, VENT & SANITARY SEAL

- A. The Watertight Cap shall be secured to the casing with a compression gasket.
- B. The cap shall include a 1-inch diameter threaded sanitary plug to allow unobstructed access to the PVC tube for water level monitoring.
- C. The top of the cap can be removed without affecting the sealed conduit, PVC water level monitoring tube or wiring.
- D. The heavy duty watertight cap will have a separate protected downward facing screened well vent with a pipe nipple.
 - 1. Pipe nipple: 1.5-inch diameter, 6-inch long.
 - 2. Screen: 24 mesh corrosion resistant.
- E. Sanitary seal: holes for piping and cables, that fits into top of casing and is removable, waterproof, and vermin proof.
- F. Construction of the cap and well vent will be of heavy duty gray cast iron and painted with a green enamel finish.

2.10 PITLESS UNIT

- A. Pitless Well adapter unit shall be installed as specified in Section 02661 – Pitless Unit

2.11 RESILIENT WEDGE GATE VALVE

- A. Resilient wedge gate valve and operator assembly shall be as specified in Section 02600 – Water Distribution

PART 3 - EXECUTION

3.1 PREPARATION

- A. Neighborhood Well Data: Review adjacent well data.

3.2 METHOD OF CONSTRUCTION

- A. Construct such that the appropriate diameter (ID) inner well casing as called out on the drawings can be installed. The Contractor's proposed method of construction is subject to approval by the Engineer.

3.3 RECORDS

- A. The Contractor shall keep an accurate log of the well. This record of the well drilling operations shall provide the following information and submitted to the Owner and Engineer:
1. The reference point for all depth measurements
 2. Latitude and longitude as determined by GPS to within +/- 25 feet
 3. The depth at which each change of lithology occurs
 4. The depth at which the first water was encountered
 5. The location and thickness of each aquifer
 6. The composition of the aquifer material
 7. The depth interval from which each water and formation sample was taken, and the method of obtaining the sample
 8. The depth to the static water level (SWL) and observable changes in SWL with well depth
 9. Location limits of any lost circulation zones
 10. The total depth of the completed well
 11. The nominal diameter of well bore
 12. Depth of well seal or surface grout
 13. The quantity and type of grout installed for the seal and method of placement
 14. The depth and description of the well casing
 15. Data regarding well-screen type, size, and placement in the well
 16. The depth of any water-bearing strata sealed from the well and method of seal
 17. Well development and testing methods.
- B. Contractor shall complete and file a report of the well (with copy to the Owner) with the Montana Department of Natural Resources and Conservation (DNRC) on a report form furnished for this purpose (Form No. 602).
1. Engineer or Owner will provide MDEQ with a copy of the report.
- C. Contractor shall also fill out and provide the Owner with the "Notice of Completion of Water Development" (Form No. 617) as furnished by the DNRC Water Rights Bureau for purposes of appropriating groundwater.
1. Engineer or Owner will provide MDEQ with a copy of the report.
- D. Owner will be responsible for the proper filing of "Notice of Completion of Water Development" (Form No. 617) with the DNRC Water Rights Bureau.
1. Engineer or Owner will provide MDEQ with a copy of the report.

3.4 SAMPLING OF FORMATIONS

- A. Take samples of substrata formation at the following intervals:
1. Beginning of each change in lithology;
 2. 5-foot intervals in non-water bearing zones;
 3. 3- foot intervals in water bearing zones.
- B. Samples shall be taken by methods to ensure that a representative formation sample is obtained. Care shall be taken to accurately determine the depth of the material sampled.
- C. Each sample shall be at least one-half pint in size and shall be placed in cloth or plastic bags.

- D. Each sample bag shall be clearly labeled with:
 - 1. Location of the well
 - 2. Depth at which the sample was taken
 - 3. Number of feet of formation that the sample represents
 - 4. Date and time taken.
- E. The Contractor shall store all samples in a suitable and safe place until the drilling has been completed.
- F. The Contractor shall be responsible for preparing the lithology log.

3.5 WELL CONSTRUCTION

- A. Enlarge pilot hole and install permanent casing, screen, and grout. Install first section of casing with hardened steel driving shoe of an OD slightly larger than casing couplings if threaded couplings are used.
- B. Unperforated casing is required to a minimum of 25 feet below ground surface.
- C. All zones containing water of undesirable quality or zones to be protected but excluded from final well completion shall be grouted from a point at least five feet above the zone to a point at least five feet below the zone.
- D. Set casing and liners round, plumb, and true to line.
 - 1. Casing installed in well shall extend or telescope at least 4 feet into the lower end of the well casing
 - 2. In the event that more than one string of inner casing is installed, each string shall extend or telescope at least 4 feet into the adjacent larger diameter inner casing
- E. Join casing pipe as follows:
 - 1. Ream ends of pipe and remove burrs.
 - 2. Remove scale, slag, dirt, and debris from inside and outside casing before installation.
 - 3. Cut bevel in ends of casing pipe and make threaded joints.
- F. Grout
 - 1. General:

All permanent well casing must be surrounded by a minimum of 1 ½ inches of grout around the outside of the casing. The grout must extend to at least 25 feet below ground surface or as specified in Standard 3.2.6 for special aquifer types. Grout shall be as called for on the Plans. It may be cement/sand, bentonite chips or pellets, or neat cement. Grout may be applied by gravity into an annular space where chips or pellets are used, or by tremie pipe or other conductor from the bottom up. Bentonite must be applied per the manufacturer's instructions. Where casing centralizers preclude the use of chips a high-solids bentonite-sand slurry, cement, or neat cement should be used.

Application Sufficient annular opening must be provided to permit a minimum of 1 ½ inches of grout around permanent casings, including couplings. Prior to grouting through creviced or fractured formations, bentonite or similar materials may be added to the annular opening, in the manner indicated for grouting. After cement grouting is applied, work on the well must be discontinued until the cement or concrete grout has properly set in accordance with ARM 36.21.654 (1)(d). Grout placement must be sufficient to achieve proper density or percent solids throughout the annular space and must be applied in accordance with ARM 36.21.634. The type of grout, quantity, and method of placement must be reported on the well log.

2. Bentonite clay grout: Mixture of not less than one-half pound of commercial bentonite clay to one gallon of clear water.
3. Neat cement grout: Mix grout in proportions of 1 cu.ft. (.03 cu. m) or a 94-lb (42.6-kg) sack of cement with 5 to 6 gal. (19 to 23 L) of water. Bentonite clay may be added in amounts of 3 to 5 lb/cu. ft. (1.4 to 2.3 kg/0.03 cu. m) for a 94-lb (42.6-kg) sack of cement.

G. Sealing of casing shall be in accordance with ARM 36.21.644 through 36.21.660. Special attention shall be given to ARM 36.21.654 (1)(d) and ARM 36.21.634.

1. Grout shall be cement/sand or neat cement unless otherwise specified or approved by the Engineer.
2. Casing must be provided with centralizers, evenly spaced in groups of 3 or 4 in 20 foot intervals or less.
3. Place grout continuously, from bottom to top surface, to ensure filling of annular space in one operation. Do not perform other operations in well within 72 hours after grouting of casing. When quick-setting cement is used, this period may be reduced to 24 hours.

H. Following installation of pitless unit or pitless adapter, discharge piping and electrical connections, bentonite pellets shall be poured around the permanent steel casing as backfill is replaced. The soil shall be wetted and compacted to prevent settlement around the casing. Following backfill and compaction, topsoil shall be mounded at least 6 inches high around the casing and sloped away at least 10 feet to drain.

I. The casing must be provided with centralizers in accordance with ARM 36.21.649.

3.6 SPECIAL CONDITIONS WELL CONSTRUCTION

A. Sand or gravel wells.

1. If clay or hardpan is encountered above the water bearing formation, the well must be constructed in accordance with ARM 36.21.657.
- a. In accordance with the MDEQ Expedited Review Checklist for a New NonCommunity Water Supply Well (Section 3.2.6.3), in drilled wells that penetrate an aquifer overlain by clay or other unconsolidated deposits such as sand and gravel in which significant (at least 6 feet thick) interbeds of clay are present, the well casing must be terminated in such clay strata, provided that the casing be sealed in substantially the same manner as is required in the case of consolidated formations.
2. If a sand or gravel aquifer is overlaid only by permeable soils, the well must be constructed in accordance either ARM 36.21.656.

- a. In accordance with the MDEQ Expedited Review Checklist for a New NonCommunity Water Supply Well (Section 3.2.6.2), in drilled wells that penetrate an aquifer overlain by unconsolidated formations such as sand and gravel without significant clay beds, an unperforated well casing must extend to at least one foot below the known seasonal low water table. An upper drill hole having a diameter at least three inches greater than the nominal size of the permanent casing must extend to at least 25 feet below land surface.
- b. The annular space between the upper drill hole and the well casing must be kept at least one-half full with bentonite slurry throughout the driving of the permanent casing into the aquifer. After the permanent casing is set in its final position, the remaining annular space must be filled to land surface with appropriate sealing material.
- c. If the oversized drill hole is extended to the same depth as the permanent casing, a suitable bridge must be installed between the casing and the drill hole at a position directly above the production aquifer. The remaining annular space must be completely filled and sealed to land surface with appropriate sealing material.
- d. A suitable bridge is one that prevents the sealing material from dropping into the producing formations and reducing the output of the well.
- e. If temporary casing is used to maintain the oversized drill hole, the annular space must be kept full with appropriate sealing material as the temporary casing is being withdrawn.

B. Gravel Pack Wells

1. Gravel pack must be placed in one uniform continuous operation.
2. Gravel refill pipes located in the grouted annular opening must be surrounded by a minimum of 1 ½ inches of grout.

C. Consolidated formation wells.

1. Wells that penetrate an aquifer either within or overlain by a consolidated formation must be grouted in accordance with ARM 36.21.655.
2. In accordance with the MDEQ Expedited Review Checklist for a New NonCommunity Water Supply Well (Section 3.2.6.1), in drilled wells that penetrate an aquifer either within a consolidated or confining formation, sealing of the casing must conform with one of the following procedures:
 - a) an upper drill hole, at least three inches greater in diameter than the nominal size of the permanent well casing, must extend from land surface to at least three feet into sound, consolidated formation. In no instance must said upper drill hole extend less than 25 feet below land surface; and
 - b) unperforated permanent casing must be installed to extend to this same depth, and the lower part of the casing must be sealed into the rock formation with cement grout. The remainder of the annular space to land surface must be filled with an appropriate sealing material.
 - c) If temporary surface casing is used in either of the above procedures, this casing must be of sufficient diameter to conform to the upper drill hole specifications. Withdrawal of the temporary casing must take place simultaneously with proper sealing of the annular space to land surface.

D. Naturally flowing wells.

1. Seal in accordance with ARM 36.21.658.

2. When flowing water is encountered in the well, an unperforated well casing must extend into the confining stratum overlying the artesian zone. The casing must be adequately sealed into the confining stratum so as to prevent surface and subsurface leakage from the artesian zone. If the well flows at land surface, it must be equipped with a control valve so that the flow can be completely stopped. The well must be completed with packers or appropriate sealing material that will eliminate leakage around the well casing.

3.7 WELL DEVELOPMENT

- A. Well must be developed in accordance with ARM 36.21.653. The method of well development must be described on the well log.
- B. Develop well to achieve a minimum yield of 40 gallons per minute.
 1. Extract maximum practical quantity of sand, drill fluid, and other fine materials from water-bearing formation.
 2. Avoid settlement and disturbance of strata above water-bearing formation.
 3. Do not disturb sealing around well casings.
 4. Continue developing wells until water contains no more than 2 ppm of sand by weight when the desired yield is achieved. A minimum of 5 measurements must be taken.
 5. There shall be no decrease in specific capacity during at least 1 hour of continuous development.
- C. The appropriate development techniques and duration will be determined by the Engineer and Contractor, with final approval by the Engineer.
- D. The Contractor shall provide all necessary pumps, compressors, plungers, bailers, discharge piping, flow meters, and other equipment and piping needed to develop the well by approved methods and such that an estimate of the yield from the well can be made during development.
- E. Development Records: The Contractor shall record the following information in the process of development:
 1. Description of material used in development
 2. Methods of measuring water levels (if applicable)
 3. Duration of each development operation
 4. Observation of results
 5. Production rates and specific capacity
 6. All other pertinent information

3.8 TEMPORARY CAP

- A. Provide permanent casing with temporary well cap in accordance with ARM 36.21.661. Install with top of casing a minimum of 30 inches above finished grade.

3.9 WELL SCREEN (if substituted for perforations)

- A. Furnish samples of water-bearing formation to testing laboratory and well-screen manufacturer for mechanical sieve analysis.
- B. Screen aperture size and length shall be selected by the Engineer based on aquifer tests results from the well development, formation samples and in consultation with the screen manufacturer and the contractor.
- C. The screen shall be ordered and paid for by the Contractor.
- D. After the well is developed, the Contractor shall install the well screen so that the pumping water level remains above the screen under all operating conditions.
- E. The screen and spacers shall be secured with welded connections. Welding for stainless steel shall conform to AWS D1.1.
- F. As appropriate, packers or cement grout shall be fitted to the top of the well screen assembly.

3.10 PLUMBNESS AND ALIGNMENT

- A. Following installation of the well screen, the production well shall be checked for plumbness and alignment in the presence of the Engineer and in accordance with AWWA A100-06.
- B. The Contractor shall furnish all labor, tools, and equipment to make the tests. The well shall demonstrate a deviation of no more than 2/3 of the inside diameter of the casing per 100 feet of casing length.
- C. If the well fails to meet plumbness and alignment requirements, the Engineer shall reject and abandon the faulty well without payment to the Contractor for such a well. The Engineer will relocate a new well in the same general area as the faulty well and the Contractor shall drill and build the relocated well without expense to the Owner beyond the original contract price.
- D. The casing must be provided with centralizers in accordance with ARM 36.21.649.

3.11 TESTING FOR YIELD AND PRESSURE

- A. After the well has been completely constructed and developed, the Contractor shall notify the Engineer and Owner and shall make the necessary arrangements for conducting a final aquifer test. The Contractor shall retain a hydrogeologist to observe, conduct, and report on the aquifer testing.
- B. The Contractor shall also furnish, install, and maintain equipment of approved size and type for measuring the flow of water. Such equipment may be a weir box, orifice, water meter, or other approved method.
- C. The Contractor is responsible for water disposal permit requirements (if applicable).
- D. The aquifer test will provide for continuous flow test for at least 72 hours or until a stabilized yield is reached. A "closed – in" pressure shall be determined after a stabilized is reached.

- E. Submit all information to Engineer on Montana Department of Natural Resources and Conservation Form 633 or equivalent.
 - 1. Engineer or Owner will provide a copy of the completed test and results to the Department of Environmental Quality and Montana Bureau of Mines and Geology (MBMG) on the required DNRC/DEQ Form 633 or equivalent.

3.12 WELL ABANDONMENT

- A. Follow well-abandonment procedures of ARM 36.21.670 through 36.21.678 and comply with AWWA A100.
- B. Restore ground surface to finished grade.

3.13 DISINFECTION

- A. Disinfection of every new, modified, or reconditioned groundwater source must be provided in accordance with ARM 36.21.662(1) prior to placement of well and water system into service.

More than 72 hours after disinfection, two or more water samples must be submitted to a laboratory certified by the Department of Public Health and Human Services for microbiology analysis with satisfactory results reported to MDEQ prior to placing the well into service.
- B. Disinfect water supply wells according to AWWA A100, AWWA C654 and ARM 36.21.662(1).
 - 1. Following completion of the well.
 - 2. Following installation of water supply piping.
- C. Sand and gravel used in filter pack wells shall be thoroughly hosed or sluiced with water, and shall be disinfected with a solution containing at least 50 parts per million chlorine before being placed in the well.

3.14 PROTECTION

- A. Water Quality Protection: Prevent well contamination, including undesirable physical and chemical characteristics.
- B. Ensure that mud pit will not leak or overflow into streams or wetlands. When well is accepted, remove mud and solids in mud pit from Project site and restore site to finished grade.
- C. Provide casings, seals, sterilizing agents, and other materials to eliminate contamination; shut off contaminated water.
- D. Exercise care to prevent breakdown or collapse of strata overlaying that from which water is to be drawn.

- E. Protect water supply wells to prevent tampering and introducing foreign matter. Retain temporary well cap until installation is complete.

3.15 SITE RESTORATION

- A. After completion of the well, well abandonment, and all related work, the Contractor shall reclaim the sites including topsoil placement and reseeding with native grass seed as required in areas disturbed by construction. Cuttings, drilling materials and non-dissolving drilling fluid additives, if any, shall be removed from the sites and disposed of properly.

PART 4 - MEASUREMENT AND PAYMENT

1.01 METHOD OF MEASUREMENT

- A. Measurement for this item will be of the linear feet of casing installed. It shall include, but not necessarily limited to, abandonment of the existing well, well development, installing all necessary casings, perforating, installing a cement basket, grouting, testing and providing an aquifer test, backfilling and compaction, surface seal, clean up, revegetation, disinfection, as well as all work called for in Section 02525 of these specifications and all work shown on Sheet 5 of 6 of the Plans.

1.02 BASIS OF PAYMENT

- A. Payment will be at the Contract unit price per lineal foot as designated in the Proposal.

END OF SECTION

SECTION 02516 FROST-PROOF HYDRANT

PART 1 - GENERAL

1.01 SUMMARY

- A. This section specifies the construction and installation of frost-proof hydrants.

1.02 RELATED SECTIONS

- A. 01750 – Final Cleanup
- B. 02230 – Street Excavation, Backfill and Compaction
- C. 02600 – Water Distribution.
- D. 02910 – Revegetation

1.03 SUBMITTALS

- A. Submit sufficient descriptive literature to demonstrate compliance with these specifications.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Frost-proof Hydrant.
 - 1. Simmons Freeze Flow Sanitary Yard Hydrant, Merrill NA-9000, Woodford Model Y34, or approved equal with internal drain-to-ground and siphon purge drain backflow preventer. Hydrant shall be capable of delivering 20 gallons per minute at 60 pounds per square inch. Hydrant shall have vacuum breaker on nozzle. Bury depth shall be 6'-0" Min.
 - 2. Nozzle.
 - a. Threaded with vacuum breaker.
- B. Drain Rock.
 - 1. Round washed gravel, ASTM D448 (AASHTO M 43), Size number 6.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install the frost-proof hydrant at the location shown on the Drawings.
- B. Set the hydrant vertical and at the depth noted in these specifications. Provide hydrant support at the bottom with a concrete block.
 - 1. Drain Tube.
 - a. Before installation, ensure that the 1/4 inch copper drain tube is plumbed vertical and leak tight at the connection to the base of the standpipe.
 - 2. Check drain tube for operation before backfilling by closing hydrant after full flow operation and watching for water to drain out of copper drain tube.

PART 4 - MEASUREMENT AND PAYMENT

4.01 METHOD OF MEASUREMENT

- A. Measurement will be for each Frost-proof Hydrant installed complete including 5 feet of connecting galvanized steel pipe from the standpipe base.

4.02 BASIS OF PAYMENT

- A. Payment will be at the Contract unit price for each item accepted.

END OF SECTION

SECTION 02661
PITLESS UNIT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

Complete assembled Pitless Unit including well cap, lift-out bail, hold down hooks, lift-out pipe, discharge body with support rings or ribs, spool with pressure equalizing passages, and certified to NSF 61 & 372. Note: Use of only NSF 61 Certified paint does not constitute NSF 61 & 372 Certification of the overall product.

1.01.1.1 SUBMITTALS

A. All bidders shall submit as part of their bid:

1. The Manufacturer and Model of the Pitless Unit to be installed.
2. Detailed Specifications with Drawings of the System furnished by the manufacturer.

PART 2 PRODUCTS

2.01 PITLESS UNIT

The complete Pitless Unit to be Certified to NSF 61 & 372, Baker Manufacturing Company, LLC Monitor Division, Model 6.5PS67WBWE02F2SFX (X=Hold Down Liftout Hook Assembly & All Spool Conduit Wire Passages Plugged).

Note: Use of only NSF 61 Certified paint does not constitute NSF 61 & 372 Certification of the overall product. The unit shall be factory assembled, before shipping to the site. The pitless unit must conform to the Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health & Environmental Managers, Health Education Services, Albany, NY., and/or Water Systems Council PAS-97 (04).

2.01.01 WELL CAP

The Watertight Cap shall be secured to the pitless casing with a compression gasket. The top of the cap shall be removed without affecting the sealed conduit or wiring. The heavy duty watertight cap will have a separate protected downward facing stainless steel screened well vent with pipe nipple. Construction of the cap

and well vent will be of heavy duty gray cast iron and E-coated with a green enamel finish.

2.01.02 UPPER CASING

The Upper Casing must be factory assembled to the discharge body, and the lift-out and hold down mechanism are factory assembled to the spool. Upper casing thickness must conform to the Recommended Standards for Water Works and be coated with a rust protective coating. The upper casing must provide a watertight connection from the discharge body to the well cap. The discharge port center line to be 6.5 feet below grade, and the pitless upper casing to extend 1 foot above grade.

2.01.03 SPOOL

The spool shall include 2" NPT per ANSI B 1.20.1 male or female drop pipe connection and shall be constructed of lead-free galvanized heavy duty gray cast iron, ductile iron, or steel with a lead-free galvanized plating on the wetted surface of over .010 inches thick. The spool will have O-ring grooves machined into the spool retaining the O-rings when setting or pulling the system.

The positive pressure O-ring seals shall be constructed of neoprene or equivalent. Spool shall be designed to accommodate probe tubes or water samplers and NPT ports for discharge pressure taps. O-ring protection shall be provided to prevent the seals from dragging on the upper casing when the pump is installed or removed. All spool conduit wire passages shall be plugged.

2.01.04 DISCHARGE BODY

The Discharge Body shall be constructed of lead-free galvanized ductile iron or lead-free galvanized steel. O-ring seat to be designed to prevent crevice and galvanic corrosion, dissimilar metals should be avoided. Discharge body designed with reinforcement rings or ribs to prevent distortion due to vertical movement of discharge pipe, preventing the spool from binding inside the discharge body. Minimum I.D. of the discharge body to be equal to or greater than I.D. of the well casing for ease in well servicing. Discharge outlet port to be 2-inch, type: Class

150 lb. ANSI B16.5 Flange.

2.01.05 HOLD-DOWN MECHANISM

The Pitless Unit spool shall have a hold down mechanism, factory assembled to spool and capable of preventing rotation of the pitless spool relative to the discharge body, at full rated locked rotor torque of the submersible pump motor. The spool shall have a factory assembled lift out pipe and bail, or spider capable of 15,000 lbs. rated load, to allow lifting a water filled drop pipe and pump out of the well for service. Components to be constructed of ductile iron or steel with a corrosion resistant coating.

END OF SECTION

SECTION 02661

PITLESS UNIT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

Complete assembled Pitless Unit including well cap, lift-out bail, hold down hooks, lift-out pipe, discharge body with support rings or ribs, spool with pressure equalizing passages, and certified to NSF 61 & 372. Note: Use of only NSF 61 Certified paint does not constitute NSF 61 & 372 Certification of the overall product.

1.01.1.1 SUBMITTALS

A. All bidders shall submit as part of their bid:

1. The Manufacturer and Model of the Pitless Unit to be installed.
2. Detailed Specifications with Drawings of the System furnished by the

manufacturer.

PART 2 PRODUCTS

2.01 PITLESS UNIT

The complete Pitless Unit to be Certified to NSF 61 & 372, Baker Manufacturing Company, LLC Monitor Division, Model 6.5PS67WBWE02F2SFX (X=Hold Down Liftout Hook Assembly & All Spool Conduit Wire Passages Plugged). Note: Use of only NSF 61 Certified paint does not constitute NSF 61 & 372 Certification of the overall product. The unit shall be factory assembled, before shipping to the site. The pitless unit must conform to the Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health & Environmental Managers, Health Education Services, Albany, NY., and/or Water Systems Council PAS-97 (04).

2.01.01 WELL CAP

The Watertight Cap shall be secured to the pitless casing with a compression gasket. The top of the cap shall be removed without affecting the sealed conduit or wiring. The heavy duty watertight cap will have a separate protected downward facing stainless steel screened well vent with pipe nipple. Construction of the cap and well vent will be of heavy duty gray cast iron and E-coated with a green enamel finish.

2.01.02 UPPER CASING

The Upper Casing must be factory assembled to the discharge body, and the lift-out and hold down mechanism are factory assembled to the spool. Upper casing thickness must conform to the Recommended Standards for Water Works and be coated with a rust protective coating. The upper casing must provide a watertight connection from the discharge body to the well cap. The discharge port center line to be 6.5 feet below grade, and the pitless upper casing to extend 1 foot above grade.

2.01.03 SPOOL

The spool shall include 2" NPT per ANSI B 1.20.1 male or female drop pipe connection and shall be constructed of lead-free galvanized heavy duty gray cast iron, ductile iron, or steel with a lead-free galvanized plating on the wetted surface of over .010 inches thick. The spool will have O-ring grooves machined into the spool retaining the O-rings when setting or pulling the system.

The positive pressure O-ring seals shall be constructed of neoprene or equivalent. Spool shall be designed to accommodate probe tubes or water samplers and NPT ports for discharge pressure taps. O-ring protection shall be provided to prevent the seals from dragging on the upper casing when the pump is installed or removed. All spool conduit wire passages shall be plugged.

2.01.04 DISCHARGE BODY

The Discharge Body shall be constructed of lead-free galvanized ductile iron or lead-free galvanized steel. O-ring seat to be designed to prevent crevice and galvanic corrosion, dissimilar metals should be avoided. Discharge body designed with reinforcement rings or ribs to prevent distortion due to vertical movement of discharge pipe, preventing the spool from binding inside the discharge body. Minimum I.D. of the discharge body to be equal to or greater than I.D. of the well casing for ease in well servicing. Discharge outlet port to be 2 inch, type: Class 150 lb. ANSI B16.5 Flange.

2.01.05**HOLD-DOWN MECHANISM**

The Pitless Unit spool shall have a hold down mechanism, factory assembled to spool and capable of preventing rotation of the pitless spool relative to the discharge body, at full rated locked rotor torque of the submersible pump motor. The spool shall have a factory assembled lift out pipe and bail, or spider capable of 15,000 lbs. rated load, to allow lifting a water filled drop pipe and pump out of the well for service. Components to be constructed of ductile iron or steel with a corrosion resistant coating.

END OF SECTION 02661

SECTION 02910 REVEGETATION

All applicable portions of this specification section in the MPWSS shall apply with the following additions, deletions and/or modifications.

PART 1 GENERAL

1.1 DESCRIPTION

Add following:

Areas that have been disturbed during construction shall revegetated to prevent erosion in conformance with the specification contained within this Section. This work also includes conserving, placing, and finishing topsoil placement at designated areas on the project drawings or as directed by the Engineer.

PART 2 PRODUCTS

2.1 SEED

Add the following:

Utilize the following seed mix for all areas to be seeded.

Seed Name	% Pure Live Seed	Lbs. Per Acre
Western Wheatgrass	30	*
Bluebunch Wheatgrass	20	*
Hard Fescue	20	*
Slender Wheatgrass	15	*
Green Needlegrass	15	*

* Drilled Rate = 25 lbs/acre, Broadcast and Hydroseed Rate = 50 lbs/acre

2.2 TOPSOIL

Add the following:

Utilize all salvaged topsoil conserved from clearing and grubbing operations to cover excavation and embankment slopes prior to fertilizing, seeding, or mulching.

2.4 FERTILIZER

Delete this Section.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

Delete this section and add the following:

- A. Revegetation will not be measured and considered incidental to other work items in this Contract.
- B. Placing conserved topsoil will not be measured for payment and is considered incidental to other work items in this Contract.

END OF SECTION 02910